

I. AMENDMENTS TO THE CLAIMS

Claim 1. (Previously Presented) A chimeric photoprotein obtained by replacing a region of Obelin protein of SEQ ID NO:2 with a corresponding region of Clytin photoprotein, wherein said region is located between residue 42 and 122 of SEQ ID NO: 2, wherein said chimeric photoprotein is bioluminescent and wherein said corresponding region of Clytin photoprotein is identical to said region of Obelin protein sequence that is to be replaced with the exception of at least 1 amino acid residue.

Claim 2. (Canceled)

Claim 3. (Currently Amended) A chimeric photoprotein according to claim [[2]] 1, wherein said corresponding region of Clytin photoprotein is identical to said region of Obelin protein sequence that is to be replaced with the exception of at least 5 amino acid residue.

Claim 4. (Previously Presented) A chimeric photoprotein according to claim 3, wherein said corresponding region of Clytin photoprotein is identical to said region of Obelin protein sequence that is to be replaced with the exception of at least 10 amino acid residue.

Claim 5. (Canceled)

Claim 6. (Previously Presented) A chimeric photoprotein according to claim 1, wherein said region extends from residue 50 to 94 of Obelin protein sequence (SEQ ID NO: 2).

Claim 7. (Previously Presented) A chimeric photoprotein according to claim 6, in which residues 50 to 94 of Obelin protein (SEQ ID NO: 2) are replaced with a fragment of Clytin sequence extending from residue 53 to 97.

Claim 8. (Previously Presented) A chimeric photoprotein according to claim 7, having

the amino acid sequence of SEQ ID NO: 3.

Claim 9. (Previously Presented) A chimeric photoprotein according to claim 1, further comprising one or more amino acid substitutions at positions 55, 66, 67, 73, 74, 75, 78, 83, 84, 87, 89 and 94 of Obelin sequence (SEQ ID NO: 2).

Claim 10. (Previously Presented) A fusion protein containing the photoprotein of claim 1.

Claim 11. (Previously Presented) A conjugation product between a photoprotein according to claim 1 and a molecule for analytical, diagnostic or therapeutic use.

Claim 12. (Previously Presented) An isolated nucleic acid molecule encoding a chimeric photoprotein according to claim 1.

Claim 13. (Previously Presented) An isolated nucleic acid molecule according to claim 12, encoding the protein, having a sequence selected from SEQ. NO: 4 and SEQ ID NO: 5.

Claim 14. (Previously Presented) A method for detecting calcium ions, comprising contacting a luciferin substrate with a cell expressing the chimeric photoprotein according to claim 1.

Claim 15. (Previously Presented) The method according to claim 14, wherein said luciferin substrate is coelenterazine.

Claim 16. (Previously Presented) The method according to claim 14, further comprising determining the quantity of calcium ions.

Claim 17. (Previously Presented) The method according to claim 14, further comprising determining intracellular calcium concentration.

Claim 18. (Previously Presented) A host cell bearing a nucleic acid molecule according to claim 12.

Claim 19. (Previously Presented) The host cell of claim 18, which is selected from bacterial, yeast, fungal, plant, insect and animal cells.

Claim 20. (Previously Presented) A method for producing a photoprotein, which comprises growing the host cell of claim 18 in conditions suitable for photoprotein expression, and recovering the expressed protein.

Claim 21. (Previously Presented) A method for the screening of biologically active molecules, which comprises combining said molecules with a culture of host cells according to claim 18, and determining the intracellular calcium concentration.

Claim 22. (Previously Presented) A method according to claim 21, wherein the host cells are transfected with a heterologous G-protein coupled receptor or ion channel.

Claim 23. (Previously Presented) A method for determining the amount of a molecule for analytical, diagnostic or therapeutic use, comprising subjecting the conjugation product according to claim 11 to a competitive solid-phase immunoassay, and determining the amount of said molecule.

Claim 24. (Previously Presented) A bioluminescence resonance energy transfer (BRET) system, comprising a fluorescent protein and the photoprotein of claim 8.